Bounded decision-making, teachers' reflection, and organisational learning: how research can inform teachers and teaching

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Abstract

Despite numerous efforts to align educational practice more closely with findings from educational research, there is little clarity about how educational practitioners can, in principle, use research. We propose a conceptualisation based on how research can contribute to practitioners' thinking: specifically, our framework proposes that research can inform bounded decision-making, teachers' reflection, and organisational learning. Practitioners can also use research without being aware that they are doing so. We argue that this conceptualisation of research use has potential to inform researchers and practitioners.

Keywords: research utilisation; research-informed practice; teachers; schools

Introduction

Recently there have been renewed efforts in many countries, to align educational practice more closely with findings from educational research. Within the UK, such efforts include the requirement, in the Research Excellence Framework, for universities' research to 'impact' on 'the economy, society, culture, public policy or services … beyond academia' (HEFCE, 2011, 48); the government-funded 'what works centres', created to apply research to social policy; the UK Funding Councils' *Open Access* policy which aims to ensure that research reports are freely available online (RCUK, 2013); and the (English) national survey of newly qualified teachers, which asks respondents how well their training has prepared them, 'to access educational research … to assess the robustness of educational research [and] … to understand and apply the findings from educational research' (Gov.uk, 2014). In addition, a range of public and private-sector organisations have created networks of researchers and practitioners, and have published summaries of educational research in practitioner-friendly formats (for details, see Gough, 2013), while the British Educational Research Association, in collaboration with the Royal Society for the Arts, undertook a wide-ranging deliberation on the potential role of research in teacher education, their report being influential, particularly among university-based teacher educators (BERA/RSA, 2014). Beyond the UK, efforts to 'mobilise' educational knowledge are also apparent in jurisdictions including USA, Canada, Singapore and South Africa (for example see Farley-Ripple et al., 2017; Malin et al., 2018).

This vigorous activity notwithstanding, there is little clarity about how educational practitioners might actually use research. As a recent editorial in this journal stated, '… the question of how research can 'reach' the practice of education remains a topic of ongoing conern and discussion' (Biesta et al. 2019). Such theories of research utilisation that we do possess are largely drawn from the use of research in health (e.g. Estabrooks, 1999; Smith, 2013) or from the use

of research to inform policy (e.g. Weiss, 1979; Nutley et al., 2007; Hammersley, 2013). There are good reasons for doubting whether these theories are adequate to explain educational practitioners' (broadly, teachers' and school leaders') use of research. As commentators have pointed out, whilst education and health share some similarities, there are also important differences that make it problematic to assume that research use in health is identical to that in education (e.g. Hammersley, 2013; Biesta, 2007; Whitty 2013). Likewise the way that research can inform policy seems quite different from the way it can inform practice (Nutley et al., 2007).

In response, this article proposes a new conceptual framework for understanding how research can 'reach' the practice of education; specifically, how research can inform teachers and teaching in schools directly, i.e. unmediated by policy. We begin by setting out briefly, our conceptions of educational practice and research, and we then explain how the latter can inform the former.

Educational practice

Drawing on Biesta (2015) we understand educational practice in schools (henceforth, 'schooling') to fulfil at least three functions:

- to contribute to the development of each student as an individual, by recognising their unique characteristics and potentials, and by developing their ability to act autonomously and independently
- to socialise students into ways of thinking and acting, vis-à-vis educational disciplines (e.g. thinking like a scientist or historian), and in terms of developing prosocial values, behaviours and attitudes in relation to peers, adults, and the world beyond school
- to teach subject-specific bodies of knowledge, skills and values which will qualify students to take on active roles in society – as Biesta (2015) states, 'in the narrow sense of vocational qualifications or the broad sense of becoming qualified to live in complex modern societies' (p 18).

Biesta (2015) identifies these as the 'subjectification', 'socialisation' and 'qualification' functions of schooling, and suggests that these functions are, at the level of practice, often in tension with each other. Furthermore, he argues that these functions are in flux because education is, by its nature, open, semiotic and discursive: it is open because it interacts with societal contexts and environments; semiotic because involves interpretations and meaning-making, and recursive because reflections on previous educational encounters inform future encounters.

So educational practice, whether seen in the construction of policies for an entire school, or in individual interactions with a single student, is a matter of finding a way through competing tensions and demands. This is partly because schools fulfil three functions which are not always easy to reconcile; partly because every aspect of schooling is open to challenge from students, parents and policy imperatives; partly because schooling is very largely a matter of communication

between individuals who interpret and misinterpret each other, as in all relationships; and partly because reflection and self-reflexivity are used to effect change. Taken together, these factors constitute a practice of which no two instances are identical.

The *activities* of schooling are multifarious; they include classroom lessons, assemblies, school trips, playground interactions, extra-curricular activities and a variety of formal and informal conversations. These are conducted by practitioners with a diverse range of roles and responsibilities, some of whom might focus mainly on individual students. Management of schooling is usually multi-layered: subject to governance arrangements, senior leaders assume responsibility for pastoral, academic and administrative matters within an entire school; middle leaders assume more detailed responsibility for a specified part of a school's work, and nearly everyone takes some responsibility for classroom teaching. At all levels, decisions (How long should lunch breaks be? How much time should be spent on science 'practical' lessons? When is it necessary to halt a lesson, to deal with disruptive behaviour?) affect schooling; almost all such decisions involve the exercise of professional judgments to navigate between the competing tensions we have outlined here. We believe that research can contribute to such judgements.

Educational research

Our understanding of research draws on Stenhouse's much-quoted definition, 'Research is systematic enquiry made public' (Stenhouse, 1981, p. 104). This broad definition is inclusive of methodologies and academic disciplines; it embraces qualitative, quantitative and mixed-methods research, from a variety of disciplines. At both methodological and disciplinary levels, research aspires to standards including originality, significance and rigour (HEFCE, 2011) which are formed, debated and defended, *inter alia,* by ethics committees, peer review systems and learned societies. Although poor quality research undoubtedly occurs, the maintenance of these standards ensures that 'new insights' (HEFCE, 2011) generated by research are generally more firmly grounded than insights from either the personal experience of individual practitioners, or the cumulative assumptions and practices of a profession, both of which tend to be untested. Research which is relevant to educational practitioners might include research about educational processes (e.g. 'what works'); it might also include philosophical discussions about education, studies of educational outcomes, child development, research about the subject matter to be taught, and so on.

Nevertheless, there is near-universal agreement that research-generated 'insights' are an insufficient basis for practice (e.g. Hammersley, 2002; 2013; McIntyre 2005; Winch, Oancea & Orchard, 2015). For example, McIntyre (2005) argues that the kind of knowledge that research generates differs from the kind of knowledge that teachers need. He sees research-generated knowledge as generalized, propositional knowledge; abstract and theoretical; evaluated for its clarity, coherence and validity; it is narrowly-focused and generated by rigorous and rational thinking. In contrast, practitioners' practical knowledge is 'such as to enable [teachers] to address the context-specific and indeed unique characteristics of every class, pupil, lesson and situation with which they have to

deal' (p 359). It is 'knowledge of how to do things'; it is capable of being applied to complex, multi-dimensional and unpredictable situations. In contrast, Winch, Oancea and Orchard (2015) present a more differentiated account of teachers' professional knowledge: teachers' knowledge includes situated understanding, technical know-how and critical reflection. They argue that research can, in principle, contribute to the development of each type of knowledge.

However, integrating research into professional knowledge involves an act of imagination: practitioners must actively transform insights generated in certain ways and certain circumstances, in order to employ them in different ways and circumstances (Cain 2015a). When this occurs, the usefulness of research lies in its potential to improve the quality of schooling by informing practitioners' thinking. Although it cannot replace professional judgment, it can render it more intelligent and less reliant on untested personal experience and cumulative professional wisdom.

Having sketched out these conceptions, we now consider how research can inform practitioners' thinking and thereby influence practice. Drawing on a range of theories, we distinguish three ways in which this can happen: research can inform bounded decision-making, it can inform teachers' reflection, and it can influence the school as a learning organisation.

Research can inform bounded decision-making

In discussions about evidence informed practice, it is often assumed that research contributes to practice by informing decision-making. For instance, Goldacre (2013) explicitly links the use of research evidence with improved decision-making and, as a result, better teaching:

> … we all expect doctors to be able to make informed decisions about which treatment is best, using the best currently available evidence. I think teachers could one day be in the same position. (Goldacre, 2013, 7)

This view also underpins the English government's *What Works* network, which is based on the principle that, 'good decision-making should be informed by the best available evidence' (Cabinet Office 2013). A simple and largely uncontested view of how this happens is that research generates evidence that informs decisions that are acted upon. It can be expressed thus:

evidence > decisions > actions (> = informs).

This view is only partially correct; the relationship between evidence and action is more complex than it might appear (e.g. Hammersley 2002; 2013; Kvernbekk 2016). In part, this is because the concept of 'evidence' is problematic. Although evidence has been defined as, 'facts … on which a conclusion can be based' (Webster's Dictionary, cited in Philips, 2007), facts very rarely point towards unambiguous conclusions. Logically, facts become evidence only when they are used to argue a case in some form of discussion (Spillane & Miele, 2007). For example, factual data that 95% of a school's students have achieved the expected standard in mathematics could be used as evidence to argue variously that, a) the school's students are clever, or b) that mathematics teaching in the school is

good, or c) that the expected standard for mathematics is too low. Evidence never 'speaks for itself'. Furthermore, discussions rely on certain assumptions, spoken or unspoken. In this example, assumptions might include, a) mathematics tests are a valid measure of students' ability in relation to expected standards, and b) 95% is a high figure in this context. If the evidence appears to speak for itself, this is only because the assumptions are taken for granted. This more complex understanding of the relationship between evidence and decision-making is, therefore:

assumptions > understanding evidence > discussion > decisions > actions.

Furthermore, decisions are rarely taken on the basis of single pieces of evidence. The information that 95% of students achieved the expected standard in mathematics is useful only in the light of other data such as the equivalent data for previous years or other schools. Often, at least two pieces of evidence are necessary to support decisions and sometimes, different pieces of evidence are mutually contradictory and vary in their power – i.e. the weight that they can bring to the discussion (Spillane & Miele, 2007). Because decisions are made by people who are not driven only by rational concerns, it is likely that personal preferences, emotions and power positions also play a part in decision-making, alongside other matters such as the time that is available for decision-making, the people involved, and the social contexts of the decision-making. To Brown (2018) this is 'optimal rationality'; to Author (in press) it is 'cultural rationality'. Furthermore, it has been established that decision makers sometimes make decisions first, then look for the evidence to support those decisions (Estabrooks 1999).

Perhaps the simplest, but reasonably comprehensive model of the contribution of research to the decision-making process is that multiple sources of evidence (including evidence from research) are understood in the light of assumptions, brought into discussion, from which decisions and actions emerge. It can be expressed thus:

assumptions (spoken and unspoken) > **Understanding evidence** (of differing weight and usually involving comparisons) > **discussion** (within social contexts) > **decisions > actions.**

A similar model of decision-making is explicated in Kvernbekk (2016). This involves a spiral of Claims, Grounds, Warrants, Backing, Rebuttal and Qualifiers. Both models agree that research can, in principle, inform decision-making, although not in a simple, straightforward way: it cannot generate decisions but contributes to the decision-making process by informing thinking more generally.

Such thinking is of a type that Kahneman (2011) calls 'System 2' or 'slow' thinking. This type of thinking does not happen automatically but is highly effortful; it includes the rational exploration of problems and the logical generation of solutions to these problems. It is conscious in that, when people are using this type of thinking, they are aware that they are thinking. Such thinking can inform educational decisions about the deployment of resources, and the conditions in which teaching and learning take place. Slavin (2004) lists several such decisions:

> Every year, teachers, principals, superintendents, and other educators have to make hundreds of decisions of potentially great importance to students. What reading program is most likely to ensure high reading performance? … Should summer school programs be provided to struggling students? … What are the most effective means of providing remediation to children who are falling behind? In a word: What works? (p. 27)

The decisions that Slavin refers to are essentially decisions intended to shape educational practice in general ways; they are 'bounded' in the sense that each leads to a specific outcome. Empirical evidence concurs with Slavin (2004), for '… schools used research evidence to underpin school leadership decision-making and the design of school activity' (Coldwell et al. 2017, 30). Such decisions concerned matters such as the composition of schools' policies for homework, formative assessment and feedback, peer coaching and dialogic talk (Ibid). Although such decisions are likely to be made by school leaders, research can inform the bounded decision-making of individual teachers, for instance when they select teaching resources, prepare presentations and plan how to teach and assess their students (Brown & Flood, 2018).

The influence of research in bounded decision-making might vary according to the breadth of its focus (e.g. whether tightly focused on specific interventions or more loosely focused on more general issues such as motivation), the depth of engagement (e.g. from a casual reading of a research text to a careful review of relevant literature) and the intensity of commitment to research-informed change (e.g. whether research is used primarily to support, or also to challenge thinking).

Research can inform teachers' reflection

Research on teachers thinking, largely in the 1970s and 1980s, established beyond reasonable doubt that teachers' decision-making during interactive teaching (what Schön 1983; 1987 refers to as 'reflection in action') differs substantially from the process described above. This is because, whilst the purpose of thoughtful, slow decision-making is essentially to reach an agreed choice between alternatives, the purpose of teaching is to inspire learning in others: to help students become autonomous and independent; to socialise them into ways of thinking and to enable them to learn subject-specific content. Interactive teaching occurs largely in classrooms but also, as stated earlier, during other, formal and informal occasions. Teachers' activities during interactive teaching – explaining, organizing, questioning, demonstrating, assessing students and so on – are enacted within interpersonal, teacher-student relationships. With a few exceptions (e.g. addressing large-scale assemblies), teaching involves both *encouraging* and *monitoring* learning. Encouraging and monitoring learning exist in a reciprocal relationship; the results of the monitoring influence, at least to some extent, how learning is encouraged and vice-versa. This reciprocal process of encouraging and monitoring learning occurs in the long term, as reflection-on-action, e.g. when students' test results determine which parts of a curriculum need to be revisited. It also occurs as

reflection-in-action in the classroom, e.g. when teachers perceive students to be inattentive, and adjust their teaching accordingly.

During interactive teaching, teachers have numerous interactions with students and these involve multiple, small decisions, leading Shavelson (1973 p. 18) to describe decision-making as, 'the basic teaching skill'. Because of the mutuality of encouraging and monitoring learning, this type of decision-making is not bounded but open-ended and recursive. It has been described as a reflective cycle of planning, acting, observing and evaluating (e.g. Korthagen & Vasalos 2005; Pollard 2005). For example, when questioning a class of students, teachers plan (i.e. formulate a question); act (ask the question, select a student to answer it); observe (listen to the answer), evaluate (determine its accuracy) and re-start the cycle (formulate a follow-up question) (e.g. Burbules and Bruce 2001; Wells 1993). In the 'hot' decision-making of 'crowded' classrooms (Eraut 1994) these cycles can occur several times per minute. Each decision that the teacher takes is contingent on the consequences of the previous one and each leads quickly to the next. This occurs wherever teaching is interactive: when teachers check their students' understanding of instructions or explanations, when they observe their work, listen to their talk or answer their requests for help.

Although teachers can plan their teaching, they cannot predict their students' responses, nor how they will be called upon to intensify, slow down, repeat or otherwise modify their teaching. To some extent, therefore, interactive teaching is a matter of improvisation (Sawyer 2004). What stops it from being wholly improvisational is that teachers' thinking also involves what Eraut (1994) calls 'meta processes': teachers monitor their students' responses to their teaching, and simultaneously monitor the overall progress of the lesson. Teacher thinking cycles at the level of interactions are therefore nested within similar cycles at the level of the lesson (when planned activities are modified in the light of monitoring) and the curriculum (where, for example, content that students find difficult is allocated more time than easier material).

Teachers employ 'slow' thinking, as described in the previous section, only infrequently in classrooms:

> During the interactive phase of teaching, a primary school teacher typically engages in two or three hundred interactions each hour. Individual decisions concerning how to act, are, for most of these interactions, clearly impossible, and the teacher must rely on established routine practices … Experienced teachers have come to structure their knowledge of pupils, situations and classroom contexts together with their repertoire of teaching practices to enable classroom events to be readily identified and dealt with quickly and routinely. (Calderhead 1984, p. xx)

What Calderhead (1984) recognised as quick and routine thinking, Kahneman (2011) describes as 'fast' ('System 1') thinking. As Kahneman says, this type of thinking has its weaknesses:

> System 1 is generally very good at what it does: its models of familiar situations are accurate, its short-term predictions are usually accurate as well, and its initial reactions to challenges are swift and generally

> appropriate. System 1 has biases, however, systematic errors that it is prone to make in specified circumstances. (p. 25)

Several different types of errors, common to teaching, are possible to attribute to the weaknesses of fast ('System 1') thinking. For example, teachers tend to focus on establishing and maintaining classroom activities, rather than focusing on students' learning (Calderhead 1984). They can jump to conclusions too readily; they notice evidence that supports their existing beliefs whilst ignoring contradictory evidence; and they overestimate the extent of their pupils' existing knowledge (Shavelson 1983; Calderhead 1984). Reviewing the literature on teachers' decision-making, Shavelson (1983) found that teachers were reluctant to change their thinking and acting, 'even if they are not proceeding as well as expected' (p. 32). It requires considerable mental effort to overcome such errors and the temptation is to avoid such effort (Kahneman 2011).

In terms of 'fast' decision-making whilst teaching, the role of research is not to influence teachers' individual decisions; rather, it is to enable teachers to improve their thinking and acting more generally. It can do this by influencing teachers' conceptual frameworks, which are formed by their previous experiences of teaching and being taught and also by reflection which can be stimulated by experiencing problems in their teaching and by the discourses and ideas they engage with in their professional lives. The conceptual frameworks they bring to their teaching have been variously described as 'habits of mind' (Dewey 1933), 'meta processes' (Eraut 1994), 'mindlines' (Gabbay & le May 2004); 'mental models' (Spillane & Miele 2007), and 'practical theory' (Cordingley, 2015). This variety of terms indicates the complexity of these phenomena and the difficulty of describing them. They are both conceptual and affective, and include teachers' knowledge of students, their beliefs and values, and their sense of identity and mission (Korthagen & Vasalos 1995). Perhaps the closest description to what we mean is found in Wieser (2018) who draws on Foucault's notion of Care of the Self, arguing that reflection changes the teacher's 'professional self':

> In this reflection, a teacher addresses teaching experiences which she revisits, analyses and interprets. For this interpretation, experiences are partly translated into knowledge-that, and a teacher may relate personal knowledge-that to research knowledge and evidence, in an effort to develop practical knowledge for teaching. However, re-interpretations of teaching experiences do not primarily aim to produce knowledge-that. Much rather, they are dedicated to the transformation of the professional self, which enables a teacher to address challenges experienced in teaching. (Wieser 2018, 7)

Wieser (2018) explains the process by which research informs reflection, which 'transforms … the 'professional self'. By interpreting previous experience through a research-informed lens, teachers can make a commitment to change. Such a change is not only a matter of making better decisions, but of being a better teacher (clearer, more empathic etc.). Commitments to change, made during slow, reflection-on-action thinking, are activated in the fast, intuitive thinking that is reflection-in-action (Cain 2015a). Such commitments might vary in their focus (e.g. from a narrow focus such as imposing clear rules for

behaviour on a specific group of pupils, to a wide focus such as becoming a more empathic listener to all students) and intensity (e.g. from a low-intensity commitment that is soon forgotten, to a high-intensity commitment that is regularly revisited and reviewed). There might also be variation in the depth of engagement with research in the process of reflection (e.g. whether research is read until it is understood, or whether reflection focuses primarily on other matters).

Recent empirical studies provide some evidence that research can inform teachers' reflection. If time is found for volunteer teachers to read and discuss research papers, and to use these to undertake some form of practitioner inquiry, these research papers can influence teachers' thinking in two, reasonably distinct ways: they can influence what teachers think about and how they think. Through analyses of educational practice, research can give teachers ideas that they can use in their own teaching. Because educational research uses finely-graded concepts, many of which are also employed by teachers, engagement with research can help teachers to develop their own concepts, including the concepts they use to understand students, subject matter and teaching. Research can suggest focuses for teachers to inquire into their own practice and can encourage them to challenge their established ways of thinking and acting. Importantly, engagement with research can encourage teachers to take a research orientation to their own practice. It can inspire a willingness to try out new ideas and to experiment. It can encourage a search for evidence of students' learning and a critical orientation to that evidence. In some circumstances, it can also encourage teachers to consider their ethical orientation to students (Cain, 2015b). Reviewing a literature about teachers' professional development, Cordingley (2015) found that research could contribute to CPD when teachers proactively involved specialist expertise, sought support from peers and school leaders, and adopted enquiry-oriented approaches to their development. Their learning was most effective when it was sustained over the medium term, and involved focused attention to pupils' learning and outcomes.

Further empirical support for research informing teacher thinking is found in Coldwell et al. (2017):

> There was limited evidence from this study of teachers directly importing research findings to change their practice. Rather, research more typically informed their thinking and led … to experimenting, testing out and trialling new approaches in more or less systematic ways (Coldwell et al. 2017, 7).

As a consequence of using research to critique their own practice, teachers can come to change their practice. This is a matter of reflecting, individually and perhaps with colleagues, on the relationship between insights from research and their own practice, and of forming a commitment to change this practice.

Research can inform organisational learning

As stated previously, schooling involves multifarious activities and a multi-layered management; in this context, our third proposition is that research can

raise the quality of debate within a school and thereby improve the school as a learning organisation. In organisational learning theory, an organisation is not only the individuals who comprise the organisation. Rather, organisations possess aims and values; structures and power relationships; ways of doing things; patterns of communication and ways of socialising their members into patterns of thinking and acting (Argyris & Schon, 1978). These are not static but change in response to internal and external pressures; such change has been termed 'organisational learning'.

Organisational learning can be conceptualised from several perspectives. From a behaviourist perspective, organisational learning occurs as a response to changes in the external environment. These changes can cause organisations to adopt new behaviours that, in a behaviourist understanding, constitute learning. A cognitive perspective emphasises how people within organisations create, retain and transfer knowledge, thereby generating innovations (Talbot et al. 2015). From a sociocultural perspective, organisations learn when their members articulate and explain their own ideas, critique, query or build on each other's idea, and these ideas are criticised and rejected, or refined and developed into collective knowledge (Mercer, 2000). Sociocultural theory also emphasises the role of symbolic representations of thought (Wertsch, 1991). Artefacts such as school policy documents, formally created within an organisation, are both *vehicles* for social learning (because the process of creating them causes people to consider each others' perspectives, engage with each others' ideas and sharpen their thinking generally) and *repositories* of social learning (because they inscribe learning into the institutional memory).

Organisational learning can occur at three levels: the individual, the team and the entire organisation. Senge (2006) argues that a coherent approach to organisational learning implies attention to each level and the interactions between levels, and he also examines the nature of power struggles, defensiveness and avoidance of conflict, that can discourage people from engaging productively with each other's ideas, and hence hinder organisational learning. He distinguishes between 'discussions' in which the aim of individuals is to win a debate, and 'dialogue', in which assumptions are suspended and power relationships set aside. Despite noting a tendency for 'dialogue' to slip into 'discussion', he nevertheless argues, '… collectively, we can be more insightful, more intelligent than we can possibly be individually' (p. 221).

Theories of organizational learning highlight the importance of both codified knowledge – i.e. that which is set down in mission statements, policies, protocols and so on, and tacit knowledge – the often unspoken knowledge, obtained and shared informally, that encapsulates a particular organisation's way of doing things, and might actually be quite different from official assertions in mission statements and so on (Argyris & Schon, 1978). Through working and talking together, school teachers can establish and maintain, but also critique and alter, their aims and purposes, their spoken and unspoken rules, a common repertoires of activities, and their shared understandings and values. They can develop the ability to share what they know, and to create knowledge together.

Research into Professional Learning Communities (PLCs) shows that organisations such as schools learn when their members share, examine and

critique their practice, and the norms and values that underpin that practice. They learn also through the quality and quantity of their reflective dialogue and collaboration (Kruse, Louis and Bryk, 1995). In order to be 'intellectually vigorous', Professional Learning Communities require both formally organised Continual Professional Development and 'incidental learning opportunities', in which self-evaluation and enquiry are seen as a source of learning, and there are opportunities to transfer individual learning to the whole community, and to create new knowledge together (Stoll et al., 2006). They also promote 'neighbour interactions' – opportunities for people to converse together so that ideas are presented, debated and contested (Ibid). Davis and Sumara (2008) further argue that, for these conditions to be met, there should be 'decentralised control' that allows the system itself to determine what is acceptable.

Research can provide a platform for teachers to engage in constructive and critical conversations, with a shared aim of thinking together about matters of educational importance (Earl & Timperley, 2009). It enables a discourse to be established which allows teachers to explore and discuss key educational concepts in ways which articulate with professionalism rather than only policy (Schuck et al., 2018). Unlike public educational policy, which also aims to shape schools' actions in particular ways, educational research can be used to provide alternative perspectives and open up debate; it can be critiqued and even rejected (Cain, 2017). Research can contribute to the learning of individuals (e.g. undertaking Higher Degrees), teams (e.g. via research reading groups), and the organisation (e.g. via staff development activities). Teachers' discussions, based around an identifiable topic and informed by research, have been shown to provide a stimulus for collegial explicating, sharing, questioning and critiquing both internalised, tacit knowledge and knowledge that is codified in school policies (Wiliam et al., 1994; Earl & Timperley, 2009; Cain, 2015). Such discussions can be formally organised (e.g. in collaborative action research projects, in school-based research conferences or seminars) and they can occur incidentally (e.g. as a consequence of a school's involvement with a university-led research project). Empirical evidence suggests that research is more likely to contribute to organisational learning when a schools' climate is focussed on learning, experimentation, and valuing new ideas, when there are frequent and useful interactions about teaching and learning and when there are high levels of trust in the school (Brown, Daly and Liou, 2016).

Coldwell et al. (2017) found that, in some schools, research influenced how teachers and school leaders thought together, what they thought about, what they communicated and how, their openness to new ideas, and their critical and rigorous appraisal of such ideas:

> [In] research-engaged schools … 'research use' meant integrating research evidence into all aspects of their work as part of an ethos of continual improvement and reflection. (p. 7).

They also argue that an important aspect of organisational development had to do with the organisation's ability to communicate with external organisations and actors. Without such communication, organisations can become insular and inward-looking; with it, they have opportunities for critique and self-renewal.

The influence of research in organisational learning might vary according to the breadth of focus (e.g. whether focusing only on pupils' outcomes, or including curriculum, pedagogy, values and ethics), depth of engagement (e.g. from an occasional CPD event to a regular programme of activities) and the intensity of commitment to change (e.g. whether research engagement is seen as an opportunity for collegial discussion or whether it encourages teachers to relate research to their own practice).

Unknowing use of research

In addition to our discussion above, educational research can inform practice, bypassing professional thinking. It does so by informing the development of educational policies, resources and services (including Continuous Professional Development). In these cases, practitioners can be unaware of the contribution of the research to the policies, resources and services (Cain and Allan 2017); this can be termed 'unknowing' use of research. In principle, unknowing use of research might occur during bounded decision-making, teachers' reflection and organizational learning. Evidence from the UK's Research Excellence Framework (a periodic assessment of the research undertaken in UK universities) suggests that this might be the most frequent type of research utilisation, particularly the research that is highly rated in the assessment exercise:

> Rather than contributing to a dialogue with practitioners, and advancing the professional learning of practitioners and organisations, research is more often used to generate technologies and justify policies. There is evidence that research impacts on educational structures and arrangements but very few indications … of practitioners engaging with research, interrogating and discussing it, bringing it into relationship with other forms of knowledge, and reviewing their practice in its light. (Cain & Allan, 2017, 11)

Whilst it is legitimate for research to inform policies, technologies and services, this does not necessarily translate into better teaching and learning, and there is a body of evidence that suggests that it is counterproductive to sink research efforts into developing resources without also changing teachers' thinking (Slavin 2006).

Conclusion

We have argued that research can be used by school practitioners to influence practice in the following ways:

- It can inform *bounded decision-making* by providing evidence that is understood in the light of assumptions and brought into discussion from which decisions and actions emerge
- It can inform *teachers' reflection*, influencing both what teachers think about and how they think, leading to changes in their 'professional self'
- It can inform *organizational learning* when it is brought into professional conversations, both formal and informal

In each of these categories, research informs teachers' professional thinking, helping them to form judgments that navigate through the competing tensions that characterise schooling. Additionally, research can be used unknowingly when it contributes to the development of policies, resources and services that are used by practitioners.

Research engagement in each category can range along a continuum from superficial engagement (e.g. being struck by an interesting report of research in a news bulletin or blog) to deep engagement (e.g. as part of a Higher Degree). As mentioned previously, a desire to change can prompt practitioners to focus on a narrow or a wide focus, and their commitment to change can vary in intensity.

We recognise that this conceptualisation is not the last word in theorising teachers' research use. Research use in education has not been extensively studied, and is under-theorised; in developing our conceptualisation, we have therefore drawn on a range of theories. This approach has weaknesses as well as strengths. One weakness is that we have not been able to locate our categories of research use within an overarching theory of teacher thinking that could account for the contribution of research to both the individual and collective aspects of thinking. Further work might generate theory that is better integrated. Another weakness is that our categories overlap each other. For instance, research that is used to inform bounded decision-making might inform the reflection of individual teachers (particularly those teachers involved in the decision-making); it might also inform organisational learning if it is brought into formal or informal conversations among school staff.

Nevertheless, this conceptualisation might be useful for both researchers and practitioners. When applied to practice, practitioners will likely give different credence and weight to each of the propositions outlined above. School leaders, and those whose roles are concerned with decisions taken outside the classroom, might emphasise the contribution of research to bounded decision-making, for instance around policy making at the school level. Classroom teachers and others who work closely with students will likely emphasise the contribution of research to teachers' reflection and thereby, to develop the tacit expertise of teachers which is essential to teacher-student interactions. Those with a supra-institutional role, including policy makers and senior educational leaders, might emphasise the communicative contribution of research and its contribution to organisational learning. As researchers, we believe each of these conceptualisations is essential to the educational enterprise. To improve practice, it is necessary to attend to the minutiae of everyday, teaching interactions *and* to the decisions that underpin such interactions, *and* to the channels of communication that allow ideas to be introduced, challenged, refined and adopted (Godfrey & Brown, 2019). Doing this well, means attending to the breadth of focus, the depth of engagement with research, and the intensity of commitment to research-informed change. The conceptual framework presented here provides a new and practical means for school leaders to monitor, evaluate and develop research use within their schools.

We also believe that our framework has potential to inform further empirical research and theory. Most empirical work to date has used conceptual frameworks drawn from the fields of policy or health; further work might use

one or more of our categories to guide the formation of research questions, theoretical frameworks and analysis of data. As previously stated, we have drawn on a wide range of perspectives; any of these might make a fruitful source of theoretical resources.

We have suggested that research can benefit schools in three ways but attention to only one or two of these is unlikely to generate the benefits that the proponents of research use hope for. In particular we recognise a danger that an exclusive attention to the first of our categories – bounded decision-making – could actually be detrimental to teachers and schools. Research in the USA, where educational research use has a longer history than the U.K., has shown that the phrase 'It's research-based' has been used to coerce teachers, to undermine their confidence in their own teaching, and to adopt programs and practices that they do not believe in (Nicholson–Goodman & Garman 2007). Hopefully, our conceptualisation might help schools to avoid this problem, and to realise the benefits of using research, whilst avoiding the disadvantages.

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